

REMARKS

Claims 1-6 and 24-30 are pending. Claims 1, 2, 24, 25 and 30 have been amended to require carbohydrate and silica in the claimed agropolymer. The amended claims find support in the specification and claims as originally filed and, therefore, do not constitute new matter.

At the outset, Applicant sincerely thanks Examiners Ware and Naff for the courtesy of conducting an interview on August 19, 2004 with Applicant's attorney, Peter Shen. The Examiners' comments on the cited art were most appreciated. Applicant takes this opportunity to address each of the Examiners' concerns.

The Claims Are Definite

Claims 1-6 and 24-30 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly vague and indefinite for the recitation of the term "substantially." "The term 'substantially' is often used in conjunction with another term to describe a particular characteristic of the claimed invention" and claims using the term "substantially" have been held by the Federal Circuit to be definite. *See e.g., Andrew Corp. v. Gabriel Electronics, Inc.*, 847 F.2d 819 (Fed. Cir. 1988); MPEP § 2173.05(b); *Application of Swinehart*, 439 F.2d 214 (C.C.P.A. 1971). Moreover, the Federal Circuit has recently reiterated that: "a claim is not indefinite merely because its scope is not ascertainable from the face of the claims ... rather, a claim is indefinite under § 112, ¶ 2 if it is 'insolubly ambiguous and no narrowing construction can be properly adopted'." *Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1342 (Fed. Cir. 2003) (internal citations omitted).

Applicant asserts that when read in light of the specification, the term “substantially” is definite such that one of ordinary skill in the art would understand the meaning of the term as used in the claims. Indeed, a person of ordinary skill in the art would be fully apprized of the what is meant by being “substantially devoid of proteins, tannins, and polyphenols” and thus the claims are far from insolubly ambiguous. As such, Applicant respectfully requests that the rejections under 35 U.S.C. § 112, ¶ 2 be withdrawn.

The Claims Are Not Obvious

Claims 1-6 and 24-30 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over WO 93/12877 in view of U.S. Patent No. 5,352,264 to Medina Vega (“Vega”) and U.S. Patent No. 5,830,887 to Kelly (“Kelly”). Although it is admitted that none of the three cited references teaches the claimed invention, the Office Action nevertheless concludes that one of ordinary skill in the art would have been motivated to make the combination of the three teachings to create the presently claimed agropolymer with a reasonable expectation of success: Since WO 93/12877 and Vega disclose compositions very different from the presently claimed agropolymer and Kelly is completely non-analogous art, Applicant respectfully disagrees with the contention that the combination of WO 93/12877, Vega and Kelly make the present invention obvious.

WO 93/12877 teaches a wholly different composition

Preliminarily, WO 93/12877 differs from the present invention in several important respects. First, WO 93/12877 teaches a porous body made of a gel-forming polymer.

See, e.g., WO 93/12877 at page 11 (“Preferably, the porous body is formed from a natural or synthetic gel-forming polymer.”); at page 12 (“In additionally preferred embodiments, the polymer is a gel-forming material, such as a polysaccharide or protein.”); at page 13 (“The porous bodies of this invention are preferably prepared by a novel process which employs a gel-forming polymer as a precursor material.”); at page 14 (“One novel process for preparing the porous bodies of this invention comprises: forming a gel of a desired configuration . . .”); at page 15 (“The first step requires a gel as a starting material.”).

Without question, the disclosure of WO 93/12877 when taken as a whole teaches that the gel-forming properties of their polymer is essential to their invention, which indeed would be nonoperative without such gel-forming properties because the disclosed so-called “open-celled 3-dimensional lattice structure” -- the critical feature of their claimed invention (*see, e.g.*, Abstract and claims) -- is created by the structure of the gel-forming material. *See, e.g.*, WO 93/12877 at page 6 (“As noted, one embodiment of the invention relates to a porous body derived from a polymeric material, said body having a 3-dimensional open-celled lattice structure formed from a crosslinked polymer . . .”). In contrast, the presently claimed agropolymer is not gel-forming. Indeed, while WO 93/12877 suggests a gel-forming material based on protein, the presently claimed agropolymer is substantially devoid of proteins.

Second, WO 93/12877 teaches that the polymer chains that form their “porous body” are necessarily crosslinked, and produced with cross-linking agents such as diisocyanates, diacid halides, diepoxides, epichlorohydrin, aldehydes, dialdehydes, trimetaphosphates, vinyl

sulfones, urea-formaldehydes and di-halogenated aliphatics. *See, e.g.*, WO 93/12877 at page 6 (“As noted, one embodiment of the invention relates to a porous body derived from a polymeric material, said body having a 3-dimensional open-celled lattice structure formed from a crosslinked polymer . . .”); at page 11 (“The polymer chains form the basic framework of the porous body and these polymer chains are crosslinked to an extent sufficient to maintain the polymer chains in the desired configuration.”); at page 14 (“ . . . adding an effective amount of crosslinking agent”); at page 20 (“In the second step of the process of this invention, the gel is prepared for crosslinking by replacing the initial gelling solvent with a crosslinking solvent [which] should also be non-reactive with [the] gel-forming material and crosslinking agent.”); at page 26 (“After the solvent exchange or alternative procedure for the solvent exchange is the crosslinking of the molecular polymer lattice of the gel-forming material.”). Indeed, crosslinking is a critical aspect of their invention to form the crosslinked polymer body (repeatedly referred to in WO 93/12877 as “the crosslinked porous materials of this invention”). *See also* WO 93/12877 at page 11 (“The final step of the process is to isolate the crosslinked polymer body from the crosslinking solvent.”) In direct contrast, the presently claimed agropolymer requires no crosslinking.

Third, in order to function as an ion-exchange resin, WO 93/12877 contemplates coupling the porous body to additional functional groups and/or derivatizing the groups. *See, e.g.*, WO 93/12877 at page 29, line 28 to page 31, line 4. In contrast, the presently claimed

agropolymer requires no “functionalization” or coupling to a metal-binding agent in order to have its claimed metal binding reactive sites.

Fourth, WO 93/12877 does not teach or suggest a polymer from agricultural crops or an agropolymer having carbohydrate and silica matrix. In direct contrast, the claimed agropolymer comprises carbohydrate and silica matrix obtained from one of the agricultural crops as listed in the Markush group of pending Claim 1.

In light of the numerous, critical distinctions between the porous body of WO 93/12877 and the presently claimed agropolymer, WO 93/12877’s cross-linked porous body made of a gel-forming polymer teaches away from the presently claimed agropolymer which is not a gel-forming polymer, not cross-linked, and substantially devoid of protein. Accordingly, a person of ordinary skill in the art would not have looked to WO 93/12877 or been motivated to modify or combine its teachings seeking to meet the claimed invention.

This is especially so given that WO 93/12877 suggests that plant-based materials are not suitable for forming the cross-linked highly porous body. The Examiner’s dismissal of failures in the art, cited within the primary reference (characterized in the October 6, 2003 Office Action at page 4 as “simply because of some negative testing . . .”), is clearly improper because this intrinsic evidence effectively undermines the purported motivation to modify WO 93/12877’s teachings to make the presently claimed agropolymer. Thus, Applicant respectfully submits that the claims should not be considered obvious over WO 93/12877 either singularly or in combination with Vega and/or Kelly.

Vega teaches a wholly different composition

Vega discloses taking rice or oat hulls as starting material and obtaining a liquid extract containing polyhydroxycarboxylic acid, carbohydrate, and alcohol. Vega's extract differs from the presently claimed invention in several important ways. First, it is immediately apparent that the presently claimed agropolymer is not a liquid extract but a solid polymer, which would be unsuitable for the field of soil conditioners and plant growth regulators to which Vega relates. Moreover, Vega's liquid extract would be inoperative for Applicant's field of endeavor which relates to compositions that remove metallic and other contaminants from water. Clearly, the addition of Vega's liquid extract to water would not remove anything from the water, but rather would result only in further contamination of the water.

Second, Vega's extract, which is obtained by acid hydrolysis and oxidation (*see* Vega at Col. 2, lines 40-59), is not substantially devoid of proteins. As even shown in the instant specification, the acid hydrolysis step is only capable of releasing metals from the sites to which they are bound. The step of acid hydrolysis using hydrochloric acid, sulphuric acid or nitric acid only makes the polymer substantially devoid of metal ions (not devoid of proteins), thereby creating the metal-binding reactive sites in the polymeric matrix. In order to make the polymer substantially devoid of proteins, tannins and polyphenols, the instant specification teaches that the polymer be reacted with alkali.

Notably, no such alkali reaction is taught or suggested by Vega. Therefore, Applicant asserts that the liquid extract of Vega is not made substantially devoid of proteins.

Since the pending claims require that the matrix be substantially devoid of proteins, Vega cannot teach or suggest the present invention.

Third, Vega's liquid extract does not contain silica matrix, which is an element of the pending claims. The silica present in the untreated seed hull is discarded as solid waste by the process by which Vega prepares the extract. As such, the silica matrix required by the presently claimed invention, is not present in the liquid extract of Vega. The instant specification, however, describes an agropolymer made by a process that does not discard the silica, but uses the available silica as a substrate upon which the carbohydrate adsorbs during the process. Therefore, in direct contrast to Vega, the presently claimed agropolymer comprises carbohydrate and silica matrix as a result of the selective extraction of protein, tannins and polyphenols.

Since Vega's compositions do not have silica and are not substantially devoid of proteins, when considered as a whole, Vega would have provided no motivation to the person of ordinary skill in the art to refer to its teachings or, absent improper hindsight, combine its teachings to reach the claimed invention.

Moreover, if modified in attempt to meet the presently claimed invention, the necessary modifications would change the principle of operation of Vega's compositions, -- if not be simply render Vega's extracts inoperative for their intended use -- and thus cannot form the basis of any motivation to make that modification. *See, e.g.*, MPEP § 2143.01 ("If proposed modification would render the prior art invention being modified unsatisfactorily for its intended

purpose, then there is no suggestion or motivation to make the proposed modification.”); *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984); *In re Ratti*, 270 F.2d 810 (C.C.P.A. 1959). As such, Applicant respectfully submits that the pending claims should not be considered obvious in view of Vega either singularly or in combination with WO 93/12877 and/or Kelly.

Kelly is non-analogous art

Kelly discloses a composition of natural phyto-oestrogens as nutritional supplements for people having cancer, pre-menstrual syndrome, menopause or hypercholesterolaemia. In a wholly different field of endeavor, the present invention relates to a composition to address the particular problem of removing heavy metal contaminants from water. In fact, the October 6, 2003 Office Action at page 6 admitted that “[w]ith respect to Kelly it is noted that the whole teaching in essence reads on a different invention from what Applicants’ claimed subject matter wholly discloses.” Nevertheless, the June 3, 2004 Office Action conclusory states that “[o]ne of skill in the art would not have been drawn to what [] Kelly use[s] their products for but for what they contain and the compatibility of these products for purposes of combining these well known ingredients.” Office Action at page 3. Applicant asserts that such reasoning is flawed and improper.

It is axiomatic that “[t]o rely on a reference under 35 U.S.C. § 103, it must be analogous art . . . In order to rely on a reference as a basis for rejection of an applicant’s invention, the reference must either be in the field of applicant’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.” MPEP §

2141.01(a) (internal quotations omitted). *See also In re Oetiker*, 977 F.2d 1443, 1446 (Fed. Cir. 1992). As previously urged by Applicant, the objects of the present invention and the problems addressed by Kelly are so entirely different that a person skilled in the art, faced with the problems posed at the time by the invention, would have no reason to ever refer to Kelly, and even less motivation to combine Kelly with any reference in effort to meet the presently claimed invention.

Accordingly, Kelly can only be considered non-analogous art that should not be relied upon, and as an integral part of the proffered combination of references, the Office Action fails to present a *prima facie* case of obviousness.

Combination of WO 93/12877, Vega and Kelly does not meet the claimed invention

None of the references specifically teach or suggest that the carbohydrate and silica matrix, which are obtained from seed coats, seed covers, hulls and husks of crops, can be made into an agropolymer composition. Even assuming *arguendo* that one of ordinary skill in the art would have been motivated to combine the cited references, and further assuming that Kelly was analogous art and combinable with WO 93/12877 and Vega, the proffered combination nevertheless fails to teach each and every element of the pending claims. The combination of (1) WO 93/12877's cross-linked porous body which is made of a gel-forming polymer and does not have silica; (2) Vega's composition which does not have silica and is not substantially devoid of proteins; and (3) Kelly which teaches only micronized plant parts and *Vigna mungo* and *radiata*, patently fails to meet the presently claimed agropolymers which

require carbohydrate and silica matrix, require that they be substantially devoid of proteins, and are not cross-linked or gel-forming polymers.

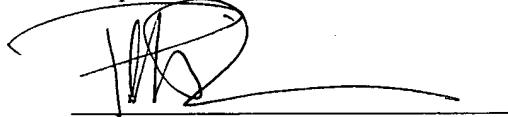
In addition, the proposed combination provides no reasonable expectation of success. As Applicant has pointed out previously, the teachings of WO 93/12877 indicate a zero percent chance of success when plant-based raw materials are used. Accordingly, one of ordinary skill in the art, even if considering the proposed combination of references at the time of the invention, would not have expected that any hybrid polymer so obtained would be at all effective for its intended use.

Conclusion

Applicant respectfully requests reconsideration of the application, and entry of the foregoing remarks into the file history of the above-identified application. Applicant believes that in light of the foregoing amendments and remarks, the claims are in condition for allowance. Applicant therefore respectfully requests withdrawal of the outstanding rejections. An allowance is earnestly sought.

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Respectfully submitted,



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